MAC 1140 Quiz 8: March 2, 2017

Name: Key
Score:

Show all work. Answers given with incomplete reasoning will not receive full credit.

Question 1 (3 points) Let \( f(x) \) be a one-to-one function with the point \((1, 2)\) on its graph and let \( g(x) \) be an odd function with \( g(\pi) = -2 \). Using this information, find \( f^{-1}(g(-\pi)) \).

Since \((1, 2)\) is on the graph of \( f(x) \), \( f(1) = 2 \).

Since \( g(x) \) is odd and \( g(\pi) = -2 \), we have \( g(-\pi) = -g(\pi) = -(-2) = 2 \).
So, \( f^{-1}(g(-\pi)) = f^{-1}(2) = 1 \), since \( f(1) = 2 \).

Question 2 (2 points) Sketch a graph of the parabola

\[ f(x) = 3x^2 - 6x + 5 \]

Complete the square: \[ f(x) = 3x^2 - 6x + 5 \]

\[ = 3 \left( x^2 - 2x + \frac{5}{3} \right) = 3 \left[ (x-1)^2 + \frac{5}{3} - 1 \right] \]

\[ = 3(x-1)^2 + 5 - 3 = 3(x-1)^2 + 2 \]

So, the graph is...
Question 3 (2 points) Find a quadratic function $f(x)$ with $y$-intercept $(0, 3)$ and $x$-intercepts $(-1, 0)$ and $(3, 0)$.

Since $(-1, 0)$ and $(3, 0)$ are $x$-intercepts of $f(x)$ and $f(x)$ is to be a quadratic, we can write $f(x) = a(x + 1)(x - 3)$.

Since $(0, 3)$ is on the graph of $f(x)$, we have $f(0) = 3$ so that

$$3 = f(0) = a(0 + 1)(0 - 3) = -3a$$

Thus, $3 = -3a \Rightarrow a = -1$.

So,

$$f(x) = -1(x + 1)(x - 3) = -(x + 1)(x - 3)$$